UNIVERSITY OF JOHANNESBURG

DEPARTMENT OF ECONOMICS AND ECONOMETRICS

NOVEMBER EXAMINATION
2016

Course	**:** Econometrics 3B
Examiner	**:** Mrs M Pretorius
Internal Moderator	**:** Mr J Kouadio
External Moderator	**:** Ms N Cattaneo (Rhodes University)
Time	**:** 180 minutes
Marks	**:** 120

Instructions:

1. Answer all questions.
2. This paper consists of 11 pages.

Surname:																				

Initials:				

Student number:									

Contact number:													

SECTION	TOTAL	MARK	AUDITED MARK
A	**50**		
B	**20**		
C	**20**		
D	**10**		
E	**20**		
TOTAL	**120**		

Section A [50]

1. Are the following statements true or false? If a statement is **false**, explain why this is the case: (30)
    a. Statistical inference in non-linear least squares regression can be made on the basis of the usual t, F and χ^2 tests when the error term is assumed to be normally distributed.

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    b. Qualitative response regression models are often known as probability models.

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    c. Non-linear least squares estimators do not possess optimal properties in finite samples, but in large samples they do have such properties.

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    d. In the logit model the dependent variable is the log of the odds ratio, which is a linear function of the regressors.

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    e. The probit model is only applicable if the underlying probability distribution is normally distributed.

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    f. All econometric models are essentially dynamic.

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    g. In the presence of a lagged regressand as a regressor, the Durbin-Watson d statistic to detect autocorrelation is practically useless.

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h. The Granger test is a test of precedence rather than a test of causality.

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i. In contrast to single-equation models, in simultaneous-equation models more than one endogenous variable is involved, necessitating as many equations as the number of endogenous variables.

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j. An identified equation may either be exactly identified or over identified.

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k. A reduced-form equation is one that expresses an exogenous variable solely in terms of the predetermined variables and the stochastic disturbances.

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l. In a model of M simultaneous equations, in order for an equation to be identified, it must exclude at least M variables appearing in the model.

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m. A necessary and not sufficient condition of identification is the order condition of identification.

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n. Cointegration means that despite being individually nonstationary, a linear combination of two or more time series can be stationary.

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o. From the estimated reduced-form coefficients one may estimate the structural coefficients. This procedure is known as indirect least squares.

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2. Discuss three problems that are associated with extending the ordinary least squares method to linear probability models. (6)

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3. Give two disadvantages of making use of the trial and error approach in estimating nonlinear regression models.
(4)

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4. Explain what is meant by simultaneous-equation bias. (4)

5. What is the connection between cointegration and spurious regression? (4)

6. What is the difference between a deterministic trend and a stochastic trend? (2)

Section B **[20]**

Consider the data provided in the Excel Worksheet Exam Data – Section B. The data used here is a random sample of 178 individuals. The variables used in the analysis are as follows:

- Cancer = 1 if individual had lung cancer and 0 did not have lung cancer (Dependent variable)
- Age = Age in years of individual
- Check = 1 if individual did undergo regular checkups and 0 if did not undergo regular checkups
- Smoking = 1 if individual was an active smoker during time of survey and 0 if not
- Weight = Weight of individual in kilograms

1. Estimate the following LPM by making use of OLS and write down your regression model:

(2)

$$Cancer_i = \beta_1 + \beta_2 Age_i + \beta_3 Check_i + \beta_4 Smoking_i + \beta_5 Weight_i + u_i$$

2. Interpret the estimated coefficients of the model. (5)

3. Do the signs of the coefficients of the independent variables make economic sense? Explain. (6)

4. Interpret the goodness of fit of the model. Is this statistic important in LPMs? (2)

5. Adjust the model by making use of WLS in order to account for heteroscedasticity. Give the regression results of your adjusted model. (5)

Section C [20]

Consider the data provided in the Excel Worksheet Exam Data – Section C. The table gives data on inventories (Y) and sales (X) for the United States for the period 1954-1999.

Make use of the Almon approach and assume that inventories depend on sales in the current year and in the preceding 4 years. Furthermore, assume that β_i can be approximated by a third-degree polynomial.

1. Construct Z variables and report the coefficients of each. (5)

2. Make use of the answers in 1. and derive the original coefficients of the distributed lag model.
(5)

3. Assume stationarity and determine the causality between sales and inventories by making use of 2, 4 and 8 lags. Discuss your results. (10)

Section D **[10]**

1. Check the identifiability of the following models by applying the order condition of identification:
   a. Keynesian model of income determination: (5)
   Consumption function: $C_t = \beta_0 + \beta_1 Y_t + u_t$
   Income identity: $Y_t = C_t + I_t$
   Where:
   C = Consumption
   Y = Income
   I = Investment (assumed exogenous)
   t = time
   u = stochastic disturbance term
   β_0 and β_1 = parameters

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   b. Phillips-type model of money-wage and price determination: (5)
   $\dot{W}_t = \alpha_0 + \alpha_1 UN_t + \alpha_2 \dot{P}_t + u_{1t}$
   $\dot{P}_t = \beta_0 + \beta_1 \dot{W}_t + \beta_2 \dot{R}_t + \beta_3 \dot{M}_t + u_{2t}$
   Where:
   $\dot{W}_t$ = rate of change of money wages
   UN_t = unemployment rate, %
   $\dot{P}_t$ = rate of change of prices
   $\dot{R}_t$ = rate of change of cost of capital
   $\dot{M}_t$ = rate of change of price of imported raw materials
   t = time
   u_1, u_2 = stochastic disturbances

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Section E **[20]**

Movements in PPI are usually scrutinised carefully because they might give some indication of where CPI is heading. But is there a real long term relationship between the two variables? Make use of appropriate methodologies (and the data provided in the Excel Worksheet Exam Data – Section E) to determine the long run and short run relationship between these variables. Clearly show all your steps.

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